

DEVICE FOR SAMPLING FLUIDS AND SLURRIES

BACKGROUND OF THE INVENTION

There are various sampling means to sample fluids, mixtures of fluids and solids (slurries), and emulsions in agitated vats however, there are instances where it is desired to sample a portion of the fluid and slurry in the agitated vat when the sampling and measurements are desired to be made upon the fluid while in a quiescent state and where there has been settling out of particles in the fluids and slurries. This is provided in the instant invention.

SUMMARY OF THE INVENTION

That the present invention comprises apparatus and process for sampling fluids, mixtures of fluids and solids (slurries), and emulsions, hereinafter fluids, whereby a sampling tube communicates with the fluid containing vat that which permits the fluids to enter one end of the sampling tube for sampling and, if desired, removal. The entrance of the fluid into the sampling tube is measurably controlled by pneumatic means; the rate of entry of the fluids and slurries permitting the sampled fluids and slurries to reach the desired quiescent state. The sampling upon the fluid is then permitted by ion sensing probe means or other appropriate means, and removal of the sample of the fluid is facilitated by pneumatic vacuum means.

After the operation is completed, the sample of fluids in the sampling tube is ejected by pneumatic means, the sampling tube interior and apparatus therein contained is washed with cleaning fluids as desired and the process repeated as necessary.

Accordingly, it is an object of the present invention to provide a means to sample a fluid, slurry, or emulsion.

Further, it is an object of the present invention to sample a fluid, slurry or emulsion in a quiescent state.

It is an additional object of the present invention to provide a means to withdraw a sample of fluid, fluid of a slurry, or emulsion.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a schematic view of the present invention in its operation as a sampling device.

FIG. 2 is a schematic diagram of the controller which sequences the operational steps of the invention.

DETAILED DESCRIPTION

The embodiment of the invention shown in FIG. 1 comprises sampling tube 10 for immersion in a representative holding vat 11 containing the fluid, slurry, or emulsion to level 13, said fluids being agitated by agitator 14. The representative vat holding the fluids, emulsions or slurries may be an integral part of a separate process of manufacture (not shown). Communicating through the upper end of sampling tube 10 is air line 15 which also connects to the controller 41. Similarly communicating through the upper end of sampling tube 10 to the fluid and solid emulsion slurry level are level sensing probes comprising common probe 16, low level probe 17 and high level probe 18. The level sensing probes feed into controller 41. Ion sensing electrode 19 also extends longitudinally through the upper end of sampling tube 10 to be immersed in the fluid, emulsion or slurry 12 with similar output connection to

controller 41. Samples of the fluid, emulsion or fluid of the slurry, are removed by means of tube 20 which extends through the upper portion of the sampling tube 10 to communicate with slurry 12 having connected to its end a fritted glass attachment 21 if same is desired or required. Sample removing tube 20 similarly feeds into controller 41 by means of line 22.

To controller 41 are operably attached air tank 100 which provides a source of compressed air, vacuum pump 110 which provides the vacuum necessary for withdrawing a sample of the fluid from sampling tube 10 through controller 41 and secondary sampler 120 comprising means for receiving and temporarily holding samples taken from sampling tube 10. Vacuum pump 110 is operably connected through controller 41 to secondary sampler 120 by means of lines 111 and 112 respectively. Air tank 100 is connected through controller 41 by means of air line 101 and to secondary sampler 120 by line 102. Secondary sampler 120 receives samples from the sampling tube 10 through controller 41 by means of line 22 and line 128.

Secondary sampler 120 has level sensing probes 121 and 122 which operably connect to controller 41 through line 123. The sample of the fluid and solid emulsion slurry is held in secondary sampler 120 and transferred by air pressure means to the field sample receiver 130 by means of tube 124 extending longitudinally through the secondary sampler 120 and communicating with the 125 sample held, tube 126 connected to tube 127 which connects with the field sample receiver 130.

FIG. 2 of the drawings shows in a schematic form the operational components of controller 41. The controller is divided into two sampling circuits — the primary sampling circuit and secondary sampling circuit, and an electrode wash circuit. The primary sampling circuit controls the operation of sampling tube 10 and secondary sampling circuit controls the sequential operation of the secondary sampler. The electrode wash circuit operates after all sampling has been accomplished to wash the apparatus and prevent a prior sample from contaminating the next sample taken.

AC power input lines 42 and 43 provide the primary source of power for both the primary and secondary sampling circuit and additionally provides operating means for fluid level sensing. To the primary side of the sensing transformers T1 and T2 are connected the sampling tube 10 fluid level sensing probes as follows: high level probe 18 and common probe 16 are connected to primary side of transformer T1 and low probe 17 and common probe 16 are connected to the primary side of transformer T2. Sensing transformers T1 and T2 are of the commercial type which provide an output when an electrical connection through a liquid is made across the probes. When sampling tube 10 is initially inserted into vat 11 (FIG. 1), or if in the initial operation the fluid and emulsion slurry 12 fills vat 11, the fluid enters sample tube 10 by virtue of solenoid valve S1 venting the entrapped air to the atmosphere through vent 71. The rise of the liquid in the sampling tube is done in a known controlled manner, namely by means of orifice means through which the air must escape as the liquid rises. In the preferred embodiment, with normal atmospheric pressure acting upon the fluid, emulsion or slurry in the vat, the time of rise of the fluid in the sampling tube is variable from one minute to thirty minutes. Should a faster rise time be desired, it is possible